

USSN 10/802,275

2

RECEIVED  
CENTRAL FAX CENTER  
DEC 03 2007Amendments to the Claims

Please amend claims 26, 29, and 34; without prejudice or disclaimer, as indicated in the following Listing of Claims.

*Listing of Claims*

1-25. (Cancelled)

26. (Currently Amended) A fuel injector comprising:

a valve member ~~which~~ that is configured to engageable with a valve seating to control fuel delivery from the injector;

an amplifier arrangement having a piston member and a control chamber, the amplifier arrangement being hydraulically coupled to the valve member via the piston member and the control chamber;

a mechanical coupler ~~for providing mechanical coupling~~ that is disposed between the piston member and the valve needle member and that is configured so as to mechanically couple the piston member to the valve member during an initial retraction of the actuator and to mechanically de-couple the piston member from the valve member after completion of the initial retraction of the actuator; and,

an actuator arrangement coupled to the piston member;

~~wherein the amplifier arrangement, the mechanical coupler, and the actuator arrangement are~~ is adapted to apply an initial retracting force to the piston member during the initial retraction of the actuator arrangement while the valve member is mechanically coupled to, and, thus, constrained to move with, the piston member to move the valve member away from the valve seating; and

wherein the actuator is also adapted to subsequently to apply a second retracting force to the piston member thereafter, while the valve member and the piston member being coupled together by the mechanical coupler only during application of the initial retracting force so that they are mechanically decoupled from, and may thus move relative to, one another during application of the second retracting force.

USSN 10/802,275

3

27. (Original) A fuel injector, as set forth in claim 26, wherein the second retracting force is less than the initial retracting force.

28. (Withdrawn) A method for operating a fuel injector for delivering fuel from the injector having a valve member which is engageable with a valve seating to control fuel delivery from the injector; a hydraulic amplifier arrangement coupled to the valve member via a piston member and a control chamber, and an actuator arrangement coupled to the piston member, the method comprising the steps of:

applying an initial retracting force to the piston member to move the valve member away from the valve seating;

applying a second retracting force to the piston member after initial movement of the valve member,

mechanically coupling the valve member and the piston member during application of the initial retracting force and decoupling from one another during application of the second retracting force; and

hydraulically moving the valve member during application of the second retracting force.

29. (Currently Amended) A fuel injector comprising:

a valve seat,

a valve member engageable with said valve seat to control fuel flow,

an actuator-hydraulic amplifier combination including a piston member, the piston member being hydraulically coupled to the valve member via a control chamber and being adapted to retract said valve member out of engagement with said valve seat, and

a mechanical coupler disposed between the piston member and the for moving said valve member, the mechanical coupler configured so as to mechanically couple said valve member and said piston member together during the an initial retracting movement of said valve member out of engagement with said valve seat, the actuator and hydraulic amplifier applying a force to the valve member through said mechanical coupler during said initial retracting movement.

wherein the mechanical coupler is further configured so as to mechanically decouple the piston member from the valve member after said initial retraction of said valve member

USSN 10/802,275

4

~~such that and for allowing said valve member is thereafter only hydraulically coupled to said piston member and is thus free to move relative to said piston member after the initial retracting movement of said valve member, the actuator hydraulic amplifier combination applying a force through said mechanical coupler during said initial retracting movement and hydraulically moving said valve member relative to said piston member after said initial retracting movement.~~

30. (Previously Presented) A fuel injector as set forth in claim 29 wherein said actuator-hydraulic amplifier combination includes an actuator for moving said piston member through said mechanical coupler and a hydraulic circuit for amplifying movement of said actuator to hydraulically move said valve member in proportion to movement of said actuator after said initial retracting movement.

31. (Withdrawn) A method of operating a fuel injector comprising the steps of:  
applying a mechanical movement to a valve member for moving the valve member from engagement with a valve seat,  
applying hydraulic pressure to the valve member in response to initial movement of the valve member from the valve seat,  
amplifying the mechanical movement hydraulically and moving the valve member relative to the mechanical movement and proportionately to the mechanical movement.

32. (Previously Presented) A fuel injector, as set forth in claim 26, wherein the mechanical coupler includes a spring.

33. (Previously Presented) A fuel injector, as set forth in claim 29, wherein the mechanical coupler includes a spring.

34. (Currently amended) A fuel injector, comprising:  
a nozzle body forming a blind bore;  
a valve ~~needle~~ member that is moveable within the blind bore and ~~being that is~~ engageable with a blind end of the blind bore to control fuel delivery through the fuel injector; and,

---

USSN 10/802,275

5

a piston member that is coupled to an actuator and that forms forming a control chamber; and,

a mechanical coupler for providing mechanical coupling between that is disposed between the piston member and the valve member and that is configured so as to mechanically couple the piston member and the valve needle, member during application of an initial retracting force such that, in response to the initial retracting force, the valve member moves with the piston member and is disengaged from the blind end of the bore;

wherein the actuator is actuatable to apply both the initial retracting force and a second retracting force to the valve member through the piston member, the mechanical coupler, and the control chamber;

wherein the mechanical coupler, the piston member and the control chamber applying the initial retracting force and the second retracting force to the valve member in response to actuation of the actuator, the initial retracting force disengaging the valve needle from and away from the blind end of the blind bore, the second retracting force being applied thereafter; and

wherein, during subsequent application of the second retracting force, the piston member and the valve needle member only being are mechanically de-coupled by the mechanical coupler while the initial retracting force is being applied, such that the piston member and valve needle member being are only hydraulically coupled and may thus move relative to one another while the second retracting force is being applied.